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FULL DETAILS AND TRANSCRIPT

Teaching Basic Computation Skills: A Fifth-Grade Challenge

KIPP DC: Key Academy, Washington, D.C. • July 2008

Topic: National Math Panel: Critical Foundations for Algebra

Practice: Mathematics Preparation for Algebra

Highlights

- Students enter fifth grade with a wide range of skills, typically around third grade
- Building a foundation in basic mathematics for 5th grade through additional support
- "Inventing" or approaching calculation problems in as many different ways as possible
- Use of estimation to judge reasonableness of answers
- Use of visual representations and manipulatives to model and practice
- Teaching equivalencies between fractions and decimals
- Using problems, that are incorrect, to have students find and explain the mistake; then later, write both correct and incorrect problems and explain likely common mistakes

About the Site

KIPP DC: Key Academy

Washington, D.C.

Demographics
98% Black
1% Hispanic
6% Special Education

Students enter the Key Academy in the fifth grade with a wide range of skills, typically at about a third grade level, where they receive intense instruction to ensure they can meet grade level benchmarks. Features of the KIPP approach:

- Teaching students to approach problems in as many different ways as possible,
- Using estimation as a way to judge the reasonableness of answers,
- Use of visual representations and manipulatives, and
- Practice strategies of having students find and explain the mistake in "incorrect" problems; develop correct and incorrect problems; write about common mistakes

Full Transcript

My name is Meghan Little. I am the fifth grade math teacher at KIPP DC: KEY Academy, which is located in Southeast Washington, DC.

When students come to KIPP in fifth grade, they enter with a huge range of abilities. Because KIPP is a middle school—it's fifth through eighth—they come to me from many different previous schools. So on average, kids come in, around a third grade level. The only constant I have seen, among students, every single year is that they are able to add. Before I can think about what skills they need to master on a fifth grade level, I need to think about what skills they are lacking. So, I start backwards and I teach third and fourth grade content, so I spend the majority of the first and second quarters of the year remediating. I teach basic place value, number sense, addition, and subtraction. And then in the third and fourth quarters, once they have built a really strong foundation in basic math, I can then sort of fast forward and jump up to fifth grade. And something that helps us cover so much content in one year is that we have extended day and so I see my students for 90 minutes a day, and then my very lowest students get an extra hour of math support from me in the afternoon.

Computational skills and number sense are the foundation of math. You need to be able to really both compute and understand why you are computing, in order to do all higher-level math and in order to use math to problem solve. And when we work on addition, when we work on subtraction, multiplication, I will give them a problem, 5+2 is 7; and then let them draw it; let them write a story about it; have them write a different story about it; make it using manipulatives; and really try and invent that problem in a real-life context as many different ways as they can, so that we are not just working on being "calculators," but we

are working on understanding what those calculations mean. So that when they get to sixth and seventh grade, and then algebra, they really understand what those computations represent in a mathematical sense. And then I think the last really big enduring understanding we want them to have is being able to not just compute—but to be able to use estimation and judge the reasonableness of their answers—so to be thinking critically about their computation, and whether or not their answers make sense.

I use a lot of visual representations, a lot of manipulatives in class. Every time we teach an algorithm we want to not only teach the algorithm, but to practice it and to move it; so we use everything from base 10 blocks, counters, number lines. When we do multiplication and subtraction and division, we want to model it with blocks: so I will use anything from beans to blocks to pretzels—but just a lot of moving and grouping and thinking about what it means to manipulate numbers when those numbers are objects. And we need to practice with manipulatives, but we also need to practice just with the computation. Students struggle with all different aspects of computation—just forgetting a step when they are dividing, or forgetting a step when they are multiplying. The biggest place, that I see number sense affecting the computation mistakes, is when we are learning about equivalencies between fractions and decimals; and when we are learning that every fraction can be represented as a decimal, and that they are the same thing. And so in order to really help students understand, that fractions and decimals are the same, even though they look so different, comes in the way that we set up the introduction of fractions and decimals. So before I ever introduce the word "fraction," I will talk about the three ways to show division: The division house or the division box is one way, and then the division sign with the dots and the bar, and then the division sign that is a fraction bar.

I think that the best instructional strategies are the ones where the students are really proud of their work; and so when you can sort of teach something and they master it and then they are able to explain it. And so, we do a lot of journaling, we do a lot of writing, in math class, and I sort of scaffold it. So I will start off the beginning of the year with giving them a problem that is incorrect, and they have to solve it and find Sally's mistake and then explain Sally's mistake. And then by the middle of the year, I have them just write their own problem; and then they have to explain how they did it, and make sure they didn't make any mistakes. And then by the end of the year, they need to be able to write a correct problem, and an incorrect problem, and explain why the correct problem is correct; and what a common mistake to make is on that sort of problem. The best way, to combat the difficulties and the mistakes, is to have a really deliberate scope and sequence that sets students up for success.